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Sierra Leone

Malaria Operational Plan FY 2023

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This fiscal year (FY) 2023 Malaria Operational Plan has been approved by the Acting U.S. Global Malaria Coordinator and reflects collaborative discussions with national malaria control programs and other partners. Funding available to support outlined plans relies on the final FY 2023 appropriation from the U.S. Congress. Any updates will be reflected in revised postings.

This document was prepared in the early months of 2022 as the COVID-19 pandemic continued to evolve worldwide, including in U.S. President's Malaria Initiative (PMI) partner countries. The effects of the pandemic on malaria control and elimination work in 2023 are difficult to predict. However, because U.S. Congressional appropriations for PMI are specific to work against malaria and any appropriations for work against COVID-19 are specific for that purpose and planned through separate future U.S. Government planning processes, this FY 2023 MOP will not specifically address the malaria-COVID-19 interface and will reassess any complementary work through timely reprogramming.

CONTENTS

ABBREVIATIONS

ACT	Artemisinin-based Combination Therapy
AL	Artemether-lumefantrine
ANC	Antenatal Care
CDC	Centers for Disease Control and Prevention
CHW	Community Health Worker
DHIS2	District Health Information System 2
DHMT	District Health Management Team
DHS	Demographic and Health Survey
DPPI	Directorate of Policy, Planning and Information
DPS	Directorate of Pharmaceutical Services
EPI	Expanded Program on Immunization
FMC	Facility Management Committee
FY	Fiscal Year
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
HCW	Health Care Worker
HMIS	Health Management Information System
iCCM	Integrated Community Case Management
IPTi	Intermittent Preventive Treatment for Infants
IPTp	Intermittent Preventive Treatment for Pregnant Women
IRS	Indoor Residual Spraying
ITN	Insecticide-treated Mosquito Net
LMIS	Logistics Management Information System
MBS	Malaria Behavior Survey
MIP	Malaria in Pregnancy
MOHS	Ministry of Health and Sanitation
MOP	Malaria Operational Plan
MSCMS	Malaria Supply Chain Monitoring System
NMCP	National Malaria Control Program
NMESP	National Malaria Elimination Strategic Plan
NMSA	National Medical Supplies Agency
OTSS+	Outreach Training and Supportive Supervision Plus
PBO	Piperonyl Butoxide
PHU	Peripheral Health Unit
PMI	U.S. President’s Malaria Initiative
RAMS	Rectal Artesunate Malaria Suppository
RDT	Rapid Diagnostic Test
RMCH	Reproductive, Maternal, and Child Health
RRIV	Report Request and Issue Voucher

SBC	Social and Behavior Change
SM&E	Surveillance, Monitoring, and Evaluation
SP	Sulfadoxine-pyrimethamine
TES	Therapeutic Efficacy Study
TWG	Technical Working Group
USAID	U.S. Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

To review the specific context for Sierra Leone, please refer to the Country Malaria Profile located on the U.S. President's Malaria Initiative's (PMI's) Sierra Leone landing page, which provides an overview of the country's malaria situation, key indicators, the National Malaria Control Program (NMCP) strategic plan, and the partner landscape.

U.S. President's Malaria Initiative

Launched in 2005, PMI supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 24 countries in sub-Saharan Africa and three programs across the Greater Mekong Subregion in Southeast Asia to control and eliminate malaria. Sierra Leone began implementation as a PMI partner country in fiscal year (FY) 2017.

Rationale for PMI's Approach in Sierra Leone

Over the past five years, Sierra Leone has significantly reduced malaria prevalence in children under five years of age, from 40 percent in 2016 to 22 percent in 2021. The provision and uptake of intermittent preventive treatment for pregnant women (IPTp) and the use of insecticide-treated mosquito nets (ITNs) by pregnant women and children under five years of age are improving; yet with over two million cases annually, challenges persist. There are gaps in qualified health care workers (HCWs) at all levels of the system, data quality issues, and stockouts of key commodities, which not only impact the overall capacity of the health system, but also uptake and acceptance of all malaria prevention and control interventions.

Overview of Planned Interventions

The proposed FY 2023 PMI funding for Sierra Leone is $14.5 million. PMI will support the following intervention areas with these funds:

1. Vector Monitoring and Control

PMI provides significant support to the NMCP in implementing vector control activities with a focus on entomological surveillance, increasing access to effective ITNs, and implementing indoor residual spraying (IRS). PMI maintains a colony of susceptible *An. gambiae* mosquitoes at two insectaries to conduct insecticide resistance monitoring and evaluate vector bionomics from mosquitoes collected through routine, systematic entomological surveillance at sentinel sites in five districts. Insecticide susceptibility data

continue to inform NMCP's selection of ITNs procured for distribution. Together, the Global Fund to Fight AIDS, Tuberculosis and Malaria and PMI will continue to purchase ITNs that are effective against Sierra Leone's *Anopheles* population. These ITNs will be distributed through routine channels, specifically antenatal care (ANC) and Expanded Program on Immunization clinic visits. In addition, PMI will continue to support IRS as an additional vector control method, especially in areas of high malaria burden. PMI will continue to build entomological laboratory analysis capacity in Sierra Leone by continuing a partnership with a local scientific institution.

2. Malaria in Pregnancy

The NMCP supports a multi-pronged approach in the prevention and control of malaria during pregnancy, including distribution of ITNs, administration of IPTp, and prompt diagnosis and case management of malaria during pregnancy. Overall, IPTp coverage has improved from 31 percent (2016 Sierra Leone Malaria Indicator Survey [MIS]) to 52 percent of women receiving three or more doses of IPTp (2021 MIS). In support of the NMCP's malaria in pregnancy (MIP) strategy, PMI will continue to support the dissemination and implementation of MIP policies and guidelines, ensuring they are available in all facilities and health providers are trained in their use. PMI will continue to support integrated supportive supervision in 10 PMI-focus districts to improve the quality of service delivery and provision of on-the-job training through mentoring and coaching of staff, including community health worker (CHW) peer supervisors to improve IPTp coverage. To ensure close collaboration between the NMCP and the Reproductive Maternal Child Health Unit, PMI supports the convening of the national MIP technical working group (TWG) with regular quarterly meetings and coordination of MIP activities. Under the new CHW Strategic Plan and establishment of the new cadre of CHWs, PMI will support the NMCP to ensure CHWs are trained in correctly administering IPTp to eligible pregnant women through training, supervision, and updating guidelines and tools.

3. Drug-Based Prevention

Seasonal malaria chemoprevention is not a strategy currently adopted or recommended in Sierra Leone per WHO guidelines. IPTi is implemented with support under the Global Fund grant. As such, PMI will continue to closely monitor progress of IPTi activities while focusing on strengthening other drug-based prevention interventions, namely IPTp.

4. Case Management

PMI will build upon its current support to the NMCP to ensure the treatment guidelines and standard operating procedures of all Ministry of Health and Sanitation directorates align with the NMCP. PMI will continue to strengthen laboratory capacity for malaria

microscopy at the national level as well as in a network of hospitals. PMI will also maintain support for integrated supportive supervision in 10 PMI-focus districts to improve the quality of service delivery and provision of on-the-job training, through mentoring and coaching of staff including CHW peer supervisors to improve case management in 10 districts. Additionally, PMI will provide support to the CHW program at the national level, helping to develop and strengthen reporting, payment, and supervisory systems. PMI will also provide training and supportive supervision to the CHWs in 10 districts to help them provide high quality prevention and case management services. Finally, PMI will provide financial incentives to CHWs in three districts.

5. Health Supply Chain and Pharmaceutical Management

PMI will support the procurement of malaria commodities and provide technical assistance to strengthen the supply chain system including improving forecasting, supply planning warehousing, and distribution of commodities and the logistics management information system (LMIS). PMI's interventions will build on previous activities to improve policies, guidelines, and strategies, develop end-to-end supply chain visibility, improve data availability and use, and develop an efficient distribution system focusing on the district and health facility levels. PMI will continue to strengthen the capacity of the Government of Sierra Leone by convening the Malaria Quantification TWG to conduct annual national stock validation and quantification and district forecasting exercises. PMI will also facilitate malaria supply chain monitoring/quality control checks at selected peripheral health units and provide technical assistance to ensure uninterrupted functioning of LMIS, support the integration of the national District Health Information System 2 (DHIS2) and the LMIS, and reduce stockouts of malaria commodities.

6. Social and Behavior Change

PMI will prioritize three behaviors for FY 2023 funds: 1) consistent ITN use, maintenance, and care, 2) prompt care-seeking within the same or next day of fever onset, and 3) provider adherence to case management guidelines. Using multi-pronged approaches (communication and non-communication based), social and behavior change (SBC) activities will be tailored to address the primary drivers that influence behavior adoption by target populations. Reductions in overall funding levels for SBC interventions are anticipated to be offset by gains in current PMI and other U.S. Agency for International Development (USAID) health investments focused on increased financial and technical support for the CHW program, as CHWs will support the delivery of community-level SBC.

7. Surveillance, Monitoring, and Evaluation

PMI will continue to strengthen malaria surveillance and strengthen the capacity at the national, district, and facility level to use malaria data to improve decision-making for program performance. PMI will improve the quality and use of data for the Health Management Information System (HMIS) and the LMIS in districts with higher malaria burdens. PMI will focus on ensuring that high-quality data are available from routine HMIS and LMIS and used to monitor trends of malaria morbidity and mortality, which is currently hampered by the lack of complete and accurate hospital data. PMI will support the NMCP to produce routine malaria performance bulletin and policy briefs, strengthen collaboration between programs, and advocate for increased investments in surveillance at both the national and district levels to achieve better quality information for more informed decision-making.

8. Operational Research and Program Evaluation

Operational research (OR) is a key priority of Sierra Leone's NMCP and is a component of their Malaria Research Agenda. A new OR team is being developed within the NMCP, and each technical area will be expected to pursue at least one OR priority per year. The NMCP is planning to establish a TWG to help guide these research priorities. PMI will participate in that group and provide guidance on the evolution of the research agenda and best practices for implementation. PMI will utilize funding from FY 2023 to support an OR study that implements automated rapid diagnostic test readers at the facility level to strengthen data quality and encourage providers to adhere to national testing and treatment protocols.

9. Capacity Strengthening

PMI will support several cross-cutting capacity building activities focused within the core technical intervention areas described above (e.g., training of health workers, building the capacity of District Health Management Teams to conduct supportive supervision and mentoring, supporting pharmaceutical management systems and community-level communications, etc.) that complement the existing work of other U.S. government entities and donors/partners. Additionally, PMI will support two embedded technical advisors at the NMCP and the CHW Hub to assist with strengthening capacity at the national level. PMI will identify local organizations for targeted capacity building to strengthen malaria control efforts.

I. CONTEXT AND STRATEGY

1. Introduction

Sierra Leone began implementation as a U.S. President's Malaria Initiative (PMI) partner country in fiscal year (FY) 2017. This FY 2023 Malaria Operational Plan (MOP) presents a detailed implementation plan for Sierra Leone, based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners. PMI is proposing activities that build on partner investments to improve and expand malaria-related services, including investments by the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund). This document provides an overview of the strategies and interventions in Sierra Leone, describes progress to date, identifies challenges and relevant contextual factors, and provides a description of activities that are planned with FY 2023 funding. For more detailed information on the country context, please refer to the Country Malaria Profile, which provides an overview of the country's malaria situation, key indicators, the NMCP strategic plan, and the partner landscape.

2. U.S. President's Malaria Initiative (PMI)

The U.S. President's Malaria Initiative (PMI) is led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC). Launched in 2005, PMI supports implementation of malaria prevention and treatment measures—insecticide-treated mosquito nets (ITNs), indoor residual spraying (IRS), accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs), intermittent preventive treatment for pregnant women (IPTp), and drug-based prevention—as well as cross-cutting interventions such as surveillance, monitoring, and evaluation (SM&E); social and behavior change (SBC); and capacity strengthening. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 24 countries in sub-Saharan Africa and three programs in the Greater Mekong Subregion in Southeast Asia to control and eliminate malaria. Over the next five years, PMI aims to save lives, reduce health inequities, and improve disease surveillance and global health security.

Under the strategy, and building upon the progress to date in PMI-supported countries, PMI will work with NMCPs and partners to accomplish the following objectives by 2026:

1. Reduce malaria mortality by 33 percent from 2015 levels in high-burden PMI partner countries, achieving a greater than 80 percent reduction from 2000.

2. Reduce malaria morbidity by 40 percent from 2015 levels in PMI partner countries with high and moderate malaria burden.
3. Bring at least 10 PMI partner countries toward national or subnational elimination and assist at least one country in the Greater Mekong Subregion to eliminate malaria.

These objectives will be accomplished by emphasizing five core areas of strategic focus:

1. **Reach the unreached:** Achieve, sustain, and tailor deployment and uptake of high-quality, proven interventions with a focus on hard-to-reach populations.
2. **Strengthen community health systems:** Transform and extend community and frontline health systems to end malaria.
3. **Keep malaria services resilient:** Adapt malaria services to increase resilience against shocks, including COVID-19 and emerging biological threats, conflict, and climate change.
4. **Invest locally:** Partner with countries and communities to lead, implement, and fund malaria programs.
5. **Innovate and lead:** Leverage new tools, optimize existing tools, and shape global priorities to end malaria faster.

3. Rationale for PMI's Approach in Sierra Leone

3.1. Malaria Overview for Sierra Leone

All geographic areas of Sierra Leone are favorable to malaria transmission, which is stable and perennial. Malaria transmission has two peaks: one that begins during the rainy season in May, and one toward the end of the season in October/November. *Plasmodium falciparum* is the most common malaria parasite, responsible for more than 90 percent of malaria cases in the country. The entire population of 8.1 million is at risk of malaria, and malaria is the leading cause of illness and death among children under five years of age.

Although case incidence remains high at 328.19 per 1,000 population at risk with more than two million cases annually, Sierra Leone has made significant gains in reducing malaria burden. From 2016 to 2021, parasitemia in children under five years of age was reduced from 40 percent to 22 percent when tested by microscopy (Sierra Leone Malaria Indicator Survey [MIS] 2016 and MIS 2021). All districts experienced reductions in parasitemia except for Western Area Urban, which increased from 6 percent to 14 percent, but still remains below the national average. According to Health Management Information System (HMIS) data, both the number of patients tested and the number of confirmed cases have also been decreasing, but the test positivity rate has mostly remained stable (60 percent in 2018 and 62.3 percent in 2021). The percentage of

cases in children under five years of age has also decreased from 63 percent in 2017 to 48 percent in 2021. Cases reported by community health workers (CHWs) have decreased significantly (from 16 percent of cases in 2019 to 4 percent of cases in 2021), but this is due to a gap in CHWs service provision with the review and re-establishment of the national CHW system.

The all-cause under-five mortality rate decreased from 156 per 1,000 population in 2014 to 122 per 1,000 population in 2019 (Demographic Health Survey [DHS] 2019). The number of severe cases reported increased slightly from 34,148 in 2020 to 36,410 in 2021, but according to HMIS data, mortality from malaria increased significantly from 1,648 in 2020 to 3,056 in 2021. This is likely due, in part, to decreased reporting in 2020 as a result of COVID-19 and continued classification challenges and data quality issues.

With respect to prevention, provision and uptake of IPTp has increased significantly, with 52 percent of women receiving three or more doses in 2021 compared to 36 percent in 2019. Additionally, while access to ITNs remains low at 43 percent (MIS 2021), the ITN use-to-access ratio is 1.08 throughout most of the country. Similarly, use of ITNs by children under five years of age and pregnant women has been steadily increasing from 44 percent for each in 2016 (MIS 2016) to 76 percent and 87 percent, respectively, in 2021 (MIS 2021). Care-seeking and testing of children under five years of age with fever have also increased, from 44 percent for both in 2016 (MIS 2016) to 75 percent and 68 percent in 2021, respectively (MIS 2021).

For more detailed information on malaria indicators, please refer to the Country Malaria Profile.

3.2. Key Challenges and Contextual Factors

The civil war, outbreaks of Ebola and COVID-19, and natural disasters have left a lasting legacy impacting not only the overall capacity of the health system, but also uptake and acceptance of all malaria prevention and control interventions. Despite significant progress in the health system, persistent challenges remain, including a shortage of qualified staff at all levels of the system. Sierra Leone has one of the world's most severe health care worker (HCW) shortages, with most recent estimates of just 0.074 physicians and 0.753 nursing and midwifery personnel per 1,000 population,[1] which is well below the World Health Organization (WHO)-defined index threshold of 4.45 skilled health workers per 1,000 population.[2] There are also important gaps in the capacity of the existing HCWs. For example, in the first round of outreach training and

[1] World Bank 2018 (https://data.worldbank.org/indicator/SH.MED.PHYS.ZS?locations=SL)
[2] WHO Health Workforce Requirements for Universal Health Coverage and the Sustainable Development Goals (https://apps.who.int/iris/bitstream/handle/10665/250330/9789241511407-eng.pdf)

supportive supervision plus (OTSS+) across 10 districts, only 4 percent of HCWs demonstrated competence in the management of uncomplicated malaria.[3] Similarly, while reporting rates have improved, the quality of the data collected remains low in some areas, impacting the country's ability to accurately monitor and evaluate progress and target interventions. A weak supply chain results in persistent stockouts of key commodities, particularly at the district and facility levels. For example, the data discrepancies when comparing the consumption data reported between the source registers at the health facilities and the report request and issue voucher (RRIV) report sent to district level are about 40 percent for ACTs and 60 percent for rapid diagnostic tests (RDTs),[4] which impacts the ability of the NMCP to forecast, procure, and distribute appropriate amounts of commodities. All of these issues impact all aspects of malaria mitigation, from care-seeking behaviors to access to and quality of health services.

3.3. PMI's Approach for Sierra Leone

PMI supports the NMCP's policies and strategies in the implementation of proven antimalarial interventions. The purchase of antimalarial commodities for the diagnosis and treatment of malaria and procurement and distribution of ITNs are among the interventions that PMI is supporting throughout Sierra Leone. To reduce stockouts of malaria commodities, PMI will use end-use verification surveys to gain insights into the reasons for commodity stockouts and assess gaps and challenges in inventory management, training, and supervision. PMI will provide technical assistance to strengthen the supply chain system including improving forecasting and supply planning of commodities, warehousing, distribution, and the Logistics Management Information System (LMIS). PMI is also assisting the NMCP in exploring why access to ITNs remains low.

In addition, PMI provides focused programming support in 10 (of 16 total) districts (Bo, Bombali, Falaba, Kailahun, Karene, Kenema, Koinadugu, Kono, Port Loko, and Pujehun) by implementing intensive supportive supervision and training to peripheral health units to improve the quality of malaria case management and malaria in pregnancy, systematically evaluating malaria behaviors to inform national strategy and through improvements to HMIS data collection and use by District Health Management Teams (DHMTs).

Because two of PMI's priorities in Sierra Leone are to reach the unreached and to strengthen community health systems, PMI will invest in the new national CHW program that is being rolled out in 2022. The new CHWs will be deployed in all districts to provide an integrated package of integrated community case management (iCCM), maternal,

[3] Impact Malaria FY 2022 Q1 Report
[4] PSM FY 2022 Workplan

newborn, and child health, and family planning/reproductive health services in the community to all population groups. This program should help to address challenges in access to health care services for much of the population. The new program standardizes recruitment, selection, training, service provision, reporting, supervision, and compensation for all CHWs. PMI will support the National CHW Hub in the development and implementation of the overall program and extend the intensive supportive supervision and training which is implemented at the facility level in 10 districts to the CHWs to improve their quality of care. Additionally, in three of those districts, PMI will provide the financial incentives per the national policy to the CHWs and develop and strengthen reporting and accountability systems. PMI will work with its partners and the Ministry of Health and Sanitation (MOHS) on sustainability of the financial incentives for CHWs.

PMI's investments in routine surveillance systems allows PMI to provide leadership and guidance for evidence-based decision-making, particularly in defining where changes or new tools are needed. For example, PMI supported entomological surveillance which documented widespread resistance to pyrethroids. PMI helped the NCMP analyze these data and procure new types of ITNs which are more effective and select an effective insecticide for IRS. Similarly, PMI has strengthened the HMIS, and the NMCP is now able to stratify by chiefdom to target interventions more effectively. For example, while IRS has been implemented in Bo and Bombali Districts in 2021 and 2022, decisions about where and how to implement IRS in FY 2023 will be made through a close consultative process with the NMCP using the HMIS, entomological, and other data to tailor IRS and other interventions to the epidemiology of malaria and changing needs, likely at the chiefdom level.

The two primary donors in Sierra Leone in the malaria sector are PMI and the Global Fund, which coordinate closely with the NMCP and each other. Contributions are made to fill identified gaps and to share costs in support of the NMCP and the objectives of the National Malaria Elimination Strategic Plan (NMESP) 2021–2025. PMI and Global Fund investments reach all areas of Sierra Leone and are generally divided by thematic areas rather than geography. PMI will continue to work closely with the Global Fund and other donors to leverage their investments in malaria and the overall health system.

3.4. Key Changes in this MOP

Overall, this MOP has no major shifts or changes in strategies. Funding for SBC activities has been reduced, as there is sufficient pipeline in the agreement to maintain the scope of activities. Additionally, funds were shifted from procurement of insecticide to implementation of IRS based on the actual costs of each in the 2021 IRS campaign. However, the overall level of investment remains constant.

II. OPERATIONAL PLAN FOR FY 2023

1. Vector Monitoring and Control

1.1. PMI Goal and Strategic Approach

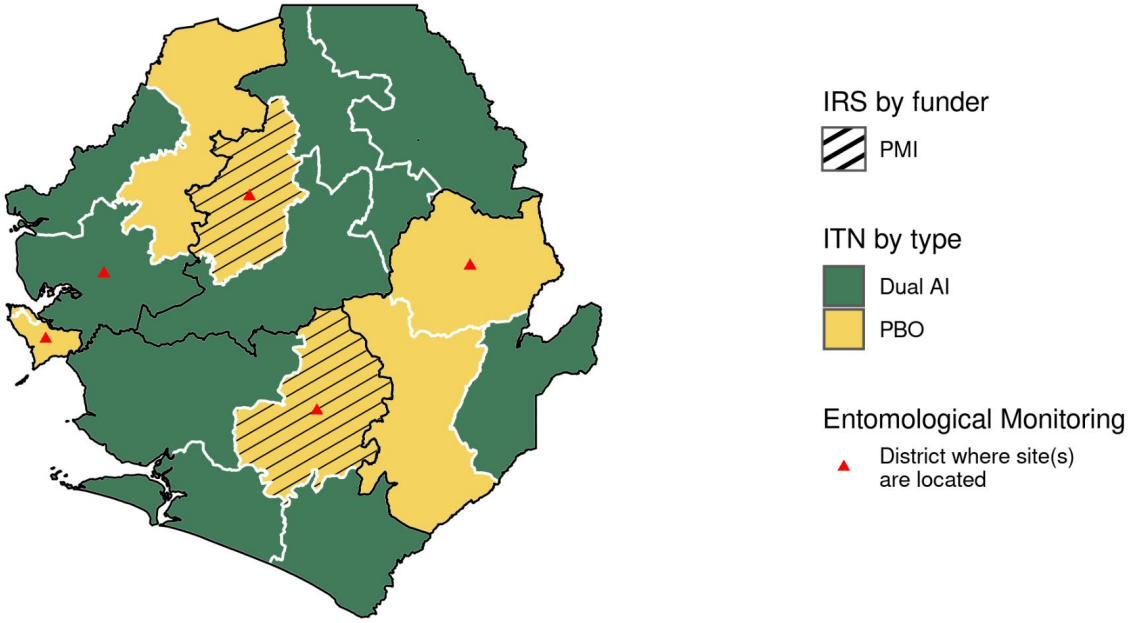
The NMESP includes four vector control interventions: universal coverage of ITNs, IRS in high burden communities, larval source management, and entomological surveillance. To enhance these interventions, it promotes an integrated vector management strategy, including vector surveillance, insecticide resistance management, continuous and mass distribution of ITNs, and geographically targeted IRS. PMI currently supports the use of all of these interventions, with the exception of larval source management. PMI supports routine entomological monitoring in five districts. Together with PMI, the Global Fund supports the implementation of mass ITN distribution campaigns every three years; the next mass campaign is planned for 2023. PMI and the Global Fund procure ITNs for continuous routine distribution via antenatal care (ANC) and Expanded Program on Immunization (EPI) channels nationwide, for which PMI supports distribution for all ITNs meant for routine distribution channels from central warehouse to peripheral health units (PHUs). PMI currently implements IRS in two districts. Although the NMESP supports larval source management as part of the current malaria control strategy in Sierra Leone, it has never been implemented. PMI guidance only supports its use in larval habitats shown to be few, fixed, and findable and only in the context of operational research or program evaluation in higher transmission settings like Sierra Leone.

PMI's objectives align with the NMCP's vector control strategy, and PMI is helping to equip the NMCP with the knowledge and skills needed for implementing an informed, evidence-based vector control program. PMI aims to:

- Support the implementation of the vector control strategy by ensuring sustained ITN coverage through both routine and mass campaign channels;
- Support collection and use of quality entomological data for decision-making;
- Support an evidence-based approach to IRS that results in a more cost-effective and efficient targeted strategy; and
- Strengthen the capacity of the MOHS-led entomology, IRS, and ITN programs.

Figure 1. Map of Planned Vector Control Activities in Sierra Leone in Calendar Year 2023

1.2.



Recent Progress (between April 2021 and March 2022)

- Supported routine entomological monitoring in ten sentinel sites with two monitoring sites in each of five districts (Bo, Bombali, Koinadugu, Kono, and Port Loko). Also supported larval collections in one entomological site in each of the five districts. These five districts represent the five regions in Sierra Leone and are monitored in collaboration with the MOHS, NMCP and the Directorate of Environmental Health. Monitoring activities include vector bionomics, insecticide resistance, and insecticide residual efficacy. For more information about entomological monitoring, please refer to the 2020 Entomological Report.
- Continued support to NMCP in building entomological capacity by managing the insectaries established in Makeni (Bombali District) in 2018 and in Freetown (Western Urban Area) in 2019 and by maintaining a colony of susceptible *An. gambiae* Kisumu strain mosquitoes. PMI is also in the process of establishing a partnership with a Sierra Leonean institution to perform the laboratory analyses on entomological samples.
- Supported the procurement of 327,631 piperonyl butoxide (PBO) ITNs and then the distribution of 627,631 PBO ITNs from both PMI and the Global Fund nationwide to all ANC clinics for pregnant women attending their first ANC visit and EPI clinics for fully immunized infants at the 14 week visit. Future ITN purchases for routine channels of distribution will be dual active ingredient ITNs.

- Supported ITN durability monitoring by performing the 12-month data collection used to monitor PermaNet® 3.0 in Bo District and Olyset® Plus in Moyamba from the 2020 mass distribution campaign cohort.
- Supported national- and facility-level SBC activities to improve demand for ITNs, increase appropriate use, promote care, and mitigate against misuse. Also supported the development and implementation of SBC activities implemented by other partners through national technical working groups (TWGs) and through District SBC TWGs. Trained and supported the Facility Management Committees to directly engage with communities to improve demand and use of ITNs. For more information, please refer to the SBC section.
- Supported the planning, implementation, and evaluation of the first year of IRS in Bo and Bombali districts, covering 150,895 structures and protecting 672,696 people between May and June 2021. For more information about IRS, please refer to the most recent End of Spray Report.
- Provided technical assistance to the NMCP and DHMTs to plan, train, supervise, and close out IRS operations in the two districts. Trained and engaged 6,549 community members, of which 43 percent were women, to support IRS mobilization and spray activities.
- Continued to support the NMCP in conducting a multi-year study to evaluate the impact of co-deploying PBO ITNs and next-generation IRS on entomological and malaria case indicators in comparison to next-generation PBO ITNs as a stand-alone intervention. Please see the Operational Research and Program Evaluation section for additional details.
- Conducted a technical training of 31 DHMT and community health public health officers, two NMCP staff, 10 seasonal technicians, and nine implementing partner technicians. They were trained on factors affecting malaria transmission patterns, *Anopheles* collection, identification, and insecticide susceptibility testing.
- Continued to support the establishment of the national malaria vector control and integrated vector management TWGs.

1.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of vector monitoring and control activities that PMI proposes to support in Sierra Leone with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

1.3.1 Entomological Monitoring

Summary of Distribution and Bionomics of Malaria Vectors in Sierra Leone
As of 2021, the primary malaria vector in Sierra Leone is *Anopheles gambiae* s.l, comprising *An. coluzzii* and *An. gambiae* s.s., and *An. funestus* group. Secondary vectors are *An. coustani* and *An. squamosus*. Peak transmission season is from May to October. Evidence from certain districts indicates a preference for indoor biting, as estimated using human landing catch. Vectors are highly anthropophilic, as indicated by the high human blood index of over 90 percent. The preferred resting location is inside houses, and the peak biting time varies by district but generally occurs between 11:00 pm and 5:00 am.

Status of Insecticide Resistance in Sierra Leone
In 2021–2022, *An. gambiae* s.l. was fully susceptible to chlorfenapyr and clothianidin, though it was resistant to all the pyrethroids tested in all districts. For pyrethroids, mortality ranged from 21 percent to 53 percent for deltamethrin; 15 percent to 50 percent for permethrin, and 22 percent to 36 percent for alpha-cypermethrin. After pre-exposure to PBO, the mortality rate for pyrethroids increased 42–86 percent for deltamethrin, 38–94 percent for permethrin, and 83–87 percent for alpha-cypermethrin for mosquitoes collected at all sites. The results indicate that a monooxygenase-based resistance mechanism is likely partially involved, but not fully responsible for the pyrethroid resistance observed.

1.3.2. Insecticide-Treated Nets

ITN Distribution in Sierra Leone
In Sierra Leone, ITNs are distributed via mass campaigns every three years, the most recent of which occurred in 2020. Continuous distribution channels are to pregnant women at their first ANC visit and infants at their Penta 3 EPI visit. The country transitioned from standard pyrethroid ITNs to PBO nets during its 2020 mass distribution campaign. Insecticide resistance data will continue to be collected and information will inform decisions on ITN procurement. PMI will purchase dual active ingredient ITNs to fill any identified gaps in 2024 to maintain uninterrupted routine distribution through ANC and EPI clinics.

Please refer to the **ITN Gap Analysis Table** in the annex for more detail on planned quantities and distribution channels.

Table 1. Standard Durability Monitoring

ITNs for the 12-month durability study were collected from Moyamba and Bo districts in May 2021. Net effectiveness against field-collected pyrethroid resistant mosquitoes was analyzed between June and October 2021. Net effectiveness against susceptible mosquitoes was measured between January and February 2022.

Campaign Date	Site	Brand	Baseline	12-month	24-month	36-month
May 22–31, 2020	Moyamba District	Olyset Plus	Nov–Dec 2020	May 2021	May 2022*	May 2023*
May 22–31, 2020	Bo District	PermaNet 3.0	Nov–Dec 2020	May 2021	May 2022*	May 2023*
May 2023	TBD	Interceptor G2	Nov 2023*	May 2024* Planned	May 2025*	May 2026*
May 2023	TBD	Interceptor G2	Nov 2023*	May 2024* Planned	May 2025*	May 2026*

*Planned implementation months

1.3.3. Indoor Residual Spraying (IRS)

Sierra Leone will continue to support IRS activities as described in the Recent Progress section. PMI will provide technical assistance to the NMCP and District Health Officers with an emphasis on local staff capacity building. Final decisions about location, scale, and insecticide will be made in conjunction with the MOHS. After three years of using the neonicotinoid, clothianidin, the class of insecticide will be rotated to a different insecticide to mitigate resistance. The choice of insecticide will be made using ongoing entomological surveillance and insecticide resistance data. A cost analysis of the 2021 Sierra Leone IRS campaign indicates a cost of $32 per structure sprayed in the country. Therefore, the FY 2023 MOP funding allotted for IRS operations will allow coverage of approximately 115,000 structures, which is a decrease from approximately 150,000 structures covered by the current campaign. Because of this decrease, there will be a withdrawal of IRS from portions of the districts where IRS is currently being conducted. In the communities where IRS has been discontinued, PMI will coordinate activities closely with the MOHS and other stakeholders to ensure that these communities receive optimal access to malaria detection, care, and case management as part of a comprehensive IRS exit strategy while targeting IRS in administrative areas and communities that have high malaria burdens to maximize the benefit of the investment in IRS in Sierra Leone.

Table 2. PMI-supported IRS Coverage

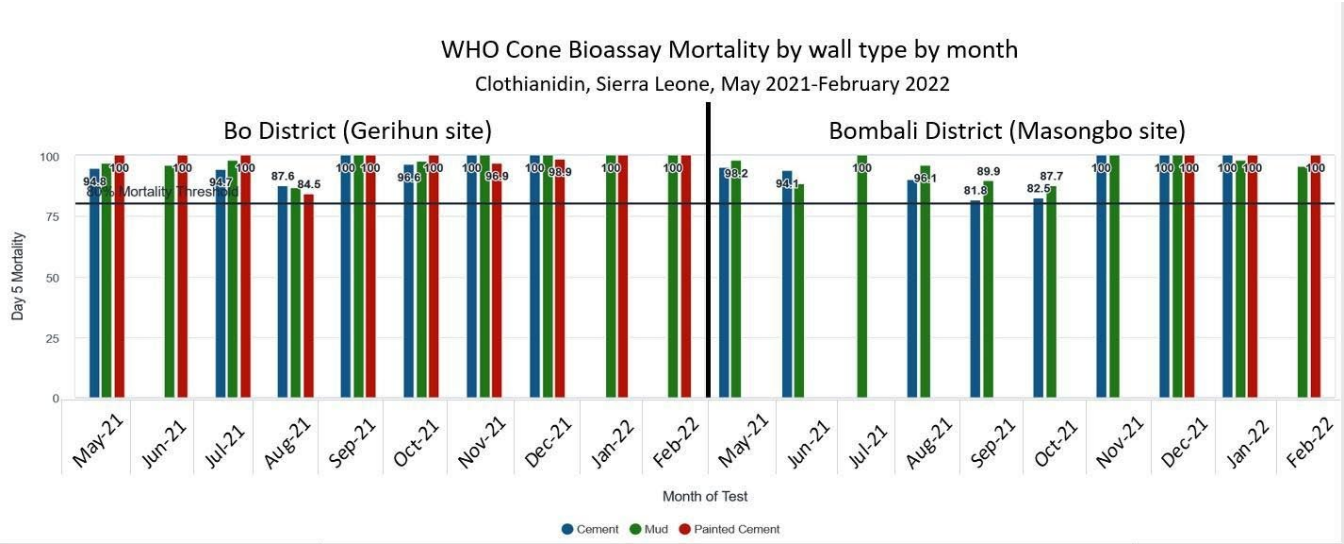
Calendar Year	District	Structures Sprayed (#)	Coverage Rate (percent)	Population Protected (#)	Insecticide
2021	Bo	92,795	97 percent	408,715	Neonicotinoid (Clothianidin)
2021	Bombali	58,100	89 percent	263,981	Neonicotinoid (Clothianidin)
2022	Bo	95,672*	TBD**	TBD**	Neonicotinoid (Clothianidin)
2022	Bombali	65,247*	TBD**	TBD**	Neonicotinoid (Clothianidin)
2023	TBD	~135,000	85+ percent	~600,000	TBD (Rotation to different insecticide class)
2024	TBD	~115,000	85+ percent	~500,000	TBD (Likely same insecticide as 2023)

*Targeted structures in 2022: **The figures will be known after the 2022 IRS campaign

IRS Insecticide Residual Efficacy in Sierra Leone

Residual efficacy data for clothianidin was monitored monthly from May 2021 until February 2022 in two sites, one each in Bo and Bombali districts. Monitoring of residual efficacy will continue until mosquito mortality reaches less than 80 percent for two consecutive months. SumiShield (clothianidin) effectiveness remained over the 80 percent WHO threshold at nine-month post-spray across the three wall types tested (Figure 2).

Figure 2. Chart of Residual Efficacy Results of Clothianidin Post-IRS by District, 2021–22



2. Malaria in Pregnancy

2.1. PMI Goal and Strategic Approach

According to the NMESP, the NMCP's objectives for malaria prevention interventions are addressed under Objective 2: By the end of 2025, reduce malaria case incidence by at least 75 percent compared to 2015. IPTp and intermittent preventive treatment for infants (IPTi) are supported under this objective. For IPTp, the goal is "to ensure increased coverage among eligible pregnant women," with sulfadoxine-pyrimethamine (SP) available at all service delivery points for directly observed therapy at ANC visits.

The NMCP adopted the 2012 WHO IPTp policy recommendations, ensuring pregnant women receive IPTp-SP doses starting early in the second trimester of pregnancy (13 weeks) and continue to receive IPTp-SP until delivery with a minimum interval of one month between doses. ITNs and IPTp are provided to pregnant women as part of the ANC package of services at health facilities aimed at making pregnancy safer. ITNs are provided for free to pregnant women at their first ANC visit and to infants through the 14-week EPI visit. The national treatment policy for the treatment of uncomplicated malaria cases during pregnancy is oral quinine plus clindamycin in the first trimester and an ACT in the second and third trimesters.

Overall IPTp coverage has improved between the most recent malaria indicator surveys. According to the 2021 MIS, 92 percent of women reported having taken one or more doses of SP, 81 percent reported taking two or more doses, and 52 percent reported taking three or more doses. In contrast, the 2016 MIS reported that 90 percent of women reported having taken one or more doses of IPTp, 71 percent of women received two or more doses, and 31 percent of women received three or more doses.

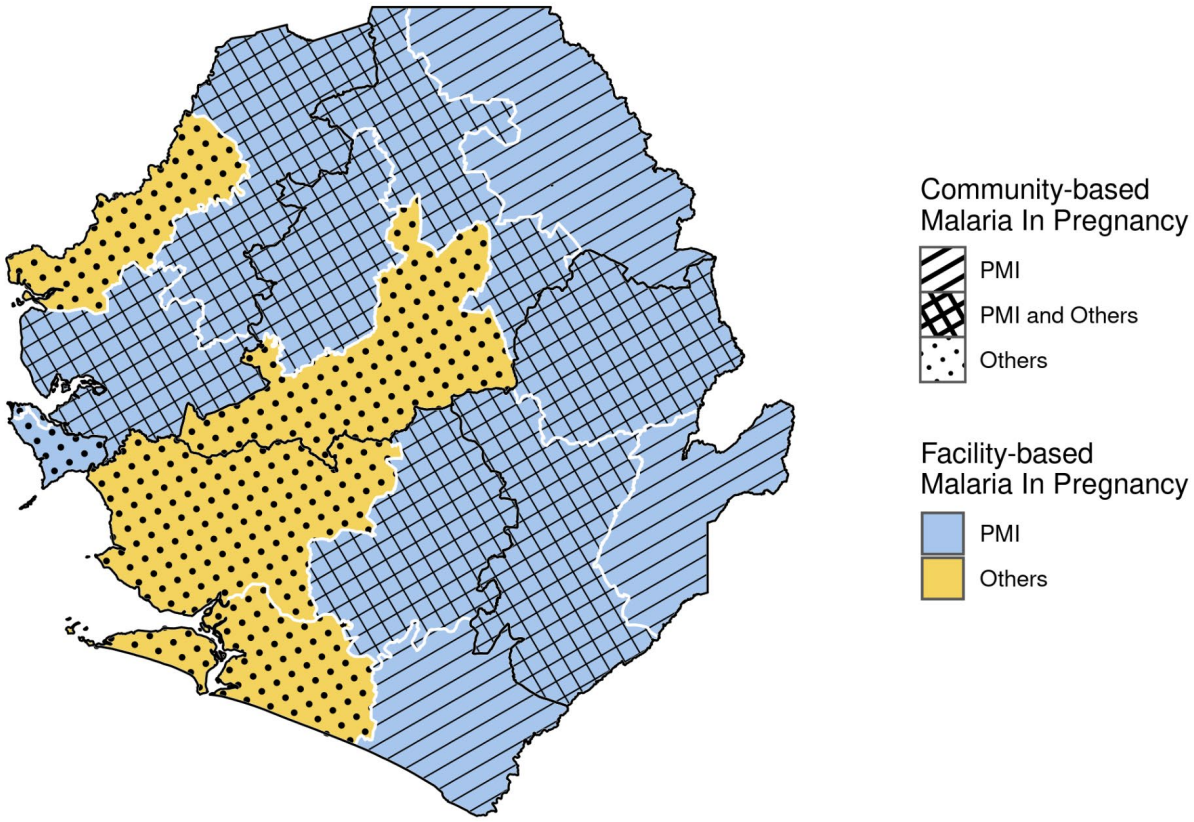
Some remaining challenges in improving IPTp uptake include its intermittent stockout at peripheral health facility levels, limited implementation of IPTp at private hospitals and clinics, and pregnant women attending their first ANC visit late during their pregnancy.

The NMCP supports the full integration of malaria in pregnancy (MIP) within the MOHS's Reproductive, Maternal, and Child Health (RMCH) Unit. The NMCP is responsible for updating guidelines and job aids on IPTp, orienting health workers on updated IPTp guidelines, producing integrated data collection tools for MIP, procuring SP for the public and private sector, and mobilizing communities on ANC attendance in collaboration with the RMCH Unit. In 2017, the MOHS adopted the 2016 WHO ANC guidelines, including the recommended eight ANC contacts during pregnancy. With the updated ANC guidelines, the MOHS recommends an additional ANC contact early in the second trimester (between 13 and 16 weeks) to administer SP as early as possible to pregnant women. Although public hospitals provide ANC services to pregnant women, training and supervision of hospital staff as well as other private health providers to ensure quality of MIP and IPTp services has been limited.

The NMCP has previously supported the provision of IPTp-SP at the community level through trained traditional birth attendants. Although this approach was scaled up nationally, monitoring and supervision of this practice was limited, and traditional birth attendants reported frequent stockouts of SP supplies at the community level. In the newly developed CHW Strategic Plan, former traditional birth attendants can be incorporated in the new cadre of health workers if they meet the basic qualifications. The MOHS aims to achieve a CHW ratio of 60 percent female and 40 percent male to assist with the uptake of health interventions targeting women of reproductive age, including MIP. The CHW package supports community administration of IPTp-SP as a component of CHW services provided at the community level to eligible pregnant women following their first ANC visit at a facility. The CHWs will help educate and promote ANC and MIP services to pregnant women, ensuring optimal timing and frequency of interventions.

PMI supports the NMCP in implementing the multi-pronged approach to MIP, including strengthening MIP services (ITNs and IPTp) at ANC and ensuring prompt diagnosis and effective treatment of malaria during pregnancy.

Figure 3. Map of Planned Malaria in Pregnancy Service Delivery Activities in Sierra Leone in Calendar Year 2023



2.2. Recent Progress (between April 2021 and March 2022)

Following the updating of MIP policies and guidelines to align with WHO and national recommendations, PMI continued to support the dissemination and implementation of MIP policies and guidelines, ensuring they are available in all facilities and peripheral health providers are trained in their use. PMI continued to support integrated supportive supervision in 10 PMI focus districts to ensure the quality of service delivery as well as supporting the implementation of the NMCP's approach to on-the-job training through mentoring and coaching of staff, including CHW peer supervisors, to improve IPTp coverage. PMI supports the close collaboration between NMCP and the RMCH Unit; to this end, PMI supports them to convene the national MIP TWG, ensuring regular quarterly meetings and coordination of MIP efforts among the two national programs and key malaria stakeholders. Under the new CHW Strategic Plan and establishment of the new cadre of CHWs, PMI will support the NMCP to provide training, supervision, and updated guidelines and tools to CHWs to ensure that they are correctly administering IPTp to eligible pregnant women.

2.3. Plans and Justification for FY2023 Funding

The FY 2023 funding tables contain a full list of MIP activities that PMI proposes to support in Sierra Leone with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

PMI will continue to support MIP activities as described in the Recent Progress section.

The current Global Fund grant provides for sufficient quantities of SP treatments for the administration of IPTp to pregnant women through 2024. As a result, PMI does not plan to procure SP for IPTp at this time. Please refer to the **SP Gap Analysis Analysis Table** in the annex for more detail on planned quantities and distribution channels.

Please see the SBC section for details on challenges and opportunities to improve intervention uptake or maintenance.

3. Drug-based Prevention

3.1. Seasonal Malaria Chemoprevention

PMI Goal and Strategic Approach

Seasonal malaria chemoprevention is not a strategy currently adopted or recommended in Sierra Leone per WHO guidelines.

3.2. Other Drug-based Prevention

By 2025, the NMCP strategy aims to reduce malaria case incidence by at least 75 percent compared to 2015. To support this objective, in 2018 Sierra Leone launched implementation of IPTi with the goal of providing all healthy infants with three doses of SP between two and nine months of age. IPTi is implemented in partnership between malaria and EPI programs, and SP for IPTi is delivered nationwide through routine EPI activities at health facilities in all 16 districts. The timing of IPTi dosing is linked to the national immunization schedule as follows:

- IPTi1 provided at the time of dose 2 of DPT/Penta (10 weeks)
- IPTi2 provided at the time of dose 3 of DPT/Penta (14 weeks)
- IPTi3 provided at the time of first dose of measles vaccine (9 months)

According to the recent 2021 MIS, among children with a vaccination card, 86 percent received one dose of IPTi, 75 percent received two doses of IPTi, and 59 percent received three doses of IPTi. To improve uptake and coverage of IPTi doses, NMCP works with the EPI program in developing and updating guidelines for IPTi implementation and training of PHU staff on the administration of SP and conducting quarterly supportive supervision of health staff at all levels. A national IPTi TWG was

established and functions with members from across the MOHS including Malaria, EPI and Child Health, as well as other donors and stakeholders. NMCP is also collaborating with international partners on a three-year, multi-country study examining the impact on uptake and operational feasibility and acceptability of administering six doses of IPTi to children through two years of age.

PMI Goal and Strategic Approach
IPTi is implemented with support under the Global Fund grant. As such, PMI will continue to closely monitor progress of IPTi activities while focusing on strengthening other drug-based prevention interventions, namely IPTp.

3.3. Recent Progress (between April 2021 and March 2022)

IPTi is implemented with support from the Global Fund and in coordination with other partners.

Plans and Justification for FY 2023 Funding
The FY 2023 funding tables contain a full list of activities related to other drug-based prevention that PMI proposes to support in Sierra Leone with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

The current Global Fund grant provides for sufficient quantities of SP treatments for the administration of IPTi to infants through 2024. As a result, PMI does not plan to procure SP for IPTi at this time. Please refer to the IPTi **Gap Analysis Table** in the annex for more detail on the planned quantities and distribution channels.

4. Case Management

4.1. PMI Goal and Strategic Approach

The NMESP builds on the previous strategy and is targeted toward ensuring the provision of diagnostic services at public, private, and community levels; ensuring the provision of effective treatment through the public sector, the private sector, and the community level; building human and institutional capacity for a quality assurance/quality control system for malaria diagnosis; monitoring the safety and efficacy of antimalarial medicines; strengthening the capacity for and monitoring the safety and efficacy of antimalarial medicines; and improving the management of severe malaria in hospitals and community health centers. The NMCP's Guidelines for Case Management of Malaria (2020) promote a comprehensive case management strategy including universal, quality-assured parasitological testing of all cases of suspected uncomplicated malaria; prompt and effective treatment with ACTs of all cases of parasitologically confirmed uncomplicated malaria, except for pregnant women in their first trimester who should receive oral quinine plus clindamycin; and pre-referral and

definitive management of severe malaria. Guidelines for Malaria Case Management include the use of rectal artesunate malaria suppositories (RAMS) as a pre-referral treatment at both the facility and community level for children under 6 years of age. The use of RAMS was introduced in 2020 at the facility level nationwide with the intent to expand to the community level. However, due to WHO's recent information note on the use of RAMS, Sierra Leone is not planning to expand it to the community level, but will instead maintain it as a facility-based pre-referral treatment until more information becomes available.

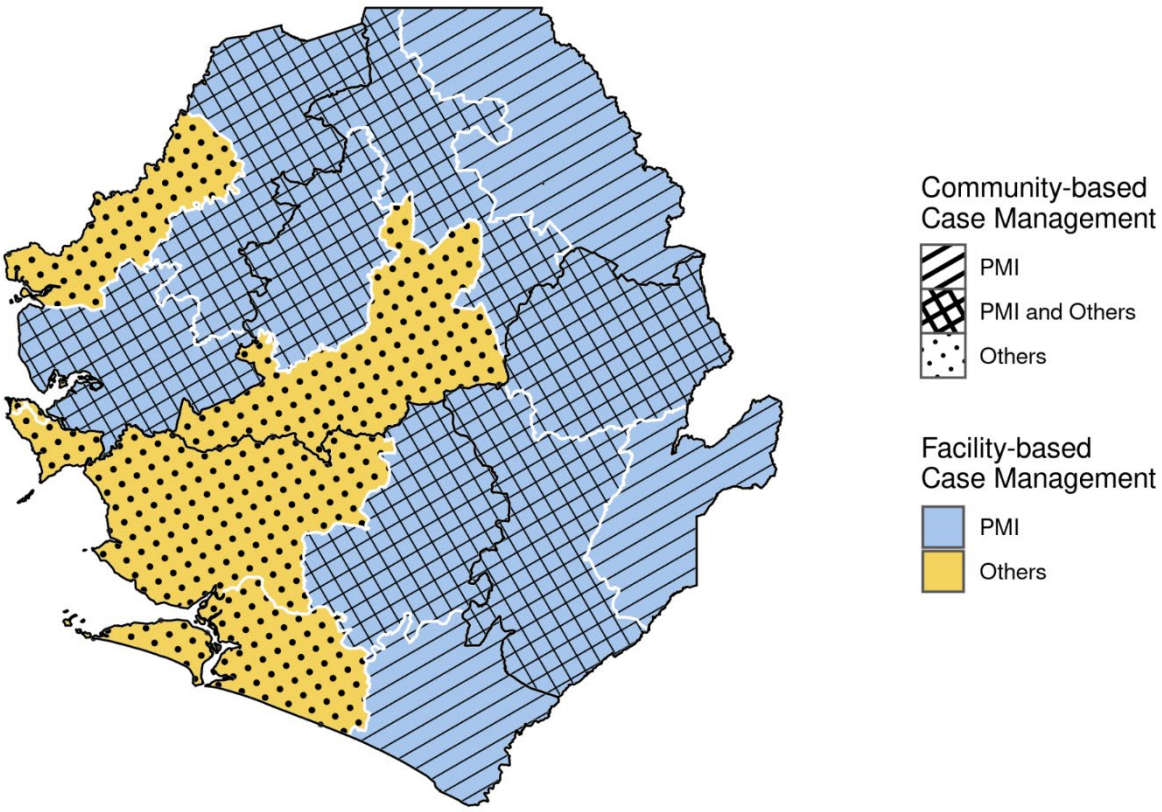
PMI supports all aspects of the NMCP's approach through support to national-level policy and programmatic activities, commodity procurement, capacity building of the DHMTs to provide outreach training and supportive supervision, capacity strengthening for malaria microscopy in hospitals, support to NMCP's outreach efforts to private facilities, and improvement of facility and community-level health worker performance. PMI supports nationwide procurement of RDTs, ACTs, and injectable and rectal artesunate, accounting for approximately 50 percent of needed commodities; the Global Fund supports procurement of the remaining 50 percent. PMI also supports outreach training and supportive supervision activities in 10 districts; the Global Fund supports all 16 districts (though support in the 10 PMI districts is more limited).

CHWs play an important role in health promotion and community-based surveillance in addition to direct malaria service delivery at the community level. In 2021, the CHW policy was updated to establish an integrated approach to scale up malaria diagnosis (and other services) at the community level. Tentatively, in May–June 2022, the new program planned to deploy 8,702 CHWs, including 4,640 CHWs in easy-to-reach areas (three to five km from a PHU), 3,133 in hard-to-reach areas (more than five 5 km from a PHU or three to five km with difficult terrain), and 869 peer supervisors in all districts to provide an integrated package of services, including iCCM. In the initial roll-out in 2022, only the CHWs in hard-to-reach areas would deliver community-based case management services that included iCCM to children under five years of age and malaria case management to all others. Once the program is more established and able to consistently quantify, forecast, and distribute commodities to CHWs, all CHWs will deliver community-based case management services to all ages. PMI's input into this policy was critical in ensuring CHWs are able to test and treat in all areas versus only those in hard-to-reach areas.

PMI will extend the ongoing facility-based onsite training and supportive supervision in 10 districts to the approximately 600 peer supervisors in those districts. PMI is working with the Ministry of Health to set up the systems to effectively provide routine financial incentives to CHWs to approximately 2,000 CHWs in three districts (Falaba, Kailahun, and Pujehun). The financial incentives for the CHWs in the other districts will be covered by the Global Fund and Gavi. The most important challenges currently faced by

the community health system are the quantification and distribution of commodities, the development of a reporting system, and the development and roll-out of a performance management system that is linked to a payment system for providing financial incentives. To address these challenges, PMI is providing technical assistance to integrate the forecasting, provision, distribution, and reporting of commodities for CHWs into the LMIS, to develop and integrate community-level indicators into the HMIS, and to pilot a payment system for financial incentives for CHWs. PMI will collaborate closely with the CHW Hub, the Global Fund, and Gavi to ultimately create a national payment system that is efficient, transparent, and reaches all CHWs.

Figure 4. Map of Planned Case Management and Community Health Service Delivery Activities in Sierra Leone in Calendar Year 2023



4.2. Recent Progress (between April 2021 and April 2022)

National-Level Case Management Activities

- Developed the Quality Assurance Manual for Malaria Microscopy and the National Laboratory Manual for Malaria Diagnosis
- Conducted:
    - Basic Malaria Diagnostic Refresher training for 40 lab technicians

    - Advanced Malaria Diagnostic Refresher training for 20 lab technicians
    - External Competency Assessment of Malaria Microscopists course for 12 lab technicians
    - Malaria Diagnostic Refresher training of trainers for 10 participants
- Building on the results of the nationwide laboratory assessment, provided mentorship and coaching to laboratories. PMI also trained 20 microscopists to conduct the second round of laboratory OTSS+ (the first round of digital laboratory OTSS+) in 53 hospitals and health facilities nationwide, reaching 202 microscopists.
- Supported the establishment of an embedded advisor in the Community Health Hub who is building the leadership and management capacity of the hub to ensure that the CHWs will deliver high-quality malaria services.
- Provided technical assistance to integrate the forecasting, provision, distribution, and reporting of commodities for CHWs into the LMIS, to develop and integrate community-level indicators into the HMIS, and to develop a performance monitoring framework.
- Began planning efforts for the development and testing of a payment system for financial incentives for CHWs.

Commodities

- Supported the procurement and distribution of 1,715,000 malaria RDTs for nationwide distribution, accounting for approximately 34 percent of needs.
- Supported the procurement and distribution of 20 microscopes and 380 Giemsa-stained slides.
- Supported the procurement and distribution of 2,401,860 ACTs for nationwide distribution, accounting for approximately 68 percent of needs.
- Supported the procurement and distribution of 300,000 vials of parenteral artesunate for nationwide distribution, accounting for approximately 49 percent of needs.
- Supported the procurement and distribution of 22,000 RAMs for nationwide distribution, accounting for approximately 100 percent of needs.

Facility Level:

- Conducted Round 1 of digital on-site training and supportive supervision visits to 813 health facilities (90 percent of target) across 10 districts, reaching 2,314 HCWs.
    - HCWs performed the best when observed on whether they adhered to the RDT results, scoring an average of 93 percent, indicating high adherence, at least while under observation.
    - When observed on how well they completed an RDT, on average they scored 85 percent, with performance across districts ranging from 78

percent in Karene to 90 percent in Koinadugu. The majority of HCWs were able to collect and apply the blood to the RDT, but often did not check the expiration date and/or label the RDT with the patient's information.
    - Districts achieved an average quality of care score of 62 percent in case management performance; in general they met all of the criteria for correctly receiving the patient, but often did not meet the criteria for completing a physical exam, checking for signs of severe malaria, and taking a general clinical history.
    - Only 4 percent of health workers demonstrated competence in management of uncomplicated malaria (defined as scoring >90 percent) on the quality of care checklist.

  The findings and feedback from this round of OTSS+ were discussed at two regional lessons learned workshops to promote data use and improve best practices. Round 2 of OTSS+ is currently underway (Jan–April 2022) and results are pending.
- Supported DHMTs to conduct case management mentorship in 29 facilities, reaching 73 HCWs (April–December 2021).
- Supported district in-charges and sub-district meetings in all 10 operational districts. These meetings are used as a forum to provide feedback to PHU staff, further discuss malaria service delivery challenges, and develop solutions.
- Conducted on-site training and supportive supervision visits in seven private facilities through collaboration between private sector associations and district health teams.

Community Level

- Mobilized resources to extend the ongoing facility-based outreach training and supportive supervision in 10 districts to the approximately 600 peer supervisors in those districts using a new OTSS+ module developed for peer supervisors. Implementation will begin in mid–2022 once the CHW program is operational.
- Provided technical guidance on completion of the 2021 National CHW Policy. (Note: the policy includes monthly financial incentives which are meant to cover day-to-day work. In the current policy, the CHWs in easy-to-reach areas receive 150,000 Leones [approximately $13 USD], CHWs in hard-to-reach areas receive 250,000 Leones [approximately $20 USD], and peer supervisors receive 300,000 Leones [approximately $25 USD]).
- PMI began working with the Ministry of Health to set up the systems to effectively provide routine financial incentives to CHWs to approximately 1,060 easy-to-reach CHWS, 706 hard-to-reach CHWs, and 196 peer

supervisors in three districts (Falaba, Kailahun, and Pujehun). The Global Fund and Gavi will cover incentives for CHWs in the other districts. PMI began planning a feasibility study of CHW payments to assess whether the PMI prerequisites have been met and if the operational and financial capacity required to implement payments in an efficient and compliant manner exists. If the results of the study are positive, PMI will pilot a payment system in one district and scale it up to three districts in 2022. Because the Global Fund and Gavi do not have the same prerequisites as PMI, they will start paying for financial incentives across the other 13 districts as soon as the program begins. PMI plans to complete the feasibility study prior to the initiation of the CHW program and initiate the pilot with the roll-out of the program in one district. The CHW Hub has identified another donor who has agreed to cover the payments for PMI districts while PMI develops, pilots, and establishes a payment system that complies with PMI requirements.

Please note that recent progress with monitoring antimalarial efficacy and the Therapeutic Efficacy Study (TES) approach is presented in the Plans and Justification for FY 2023 Funding section below.

4.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of case management activities that PMI proposes to support in Sierra Leone with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

National-level Case Management Activities

PMI will continue to support national-level case management activities as described in the Recent Progress section, though the number of facilities receiving laboratory OTSS+ support will be reduced to focus capacity building efforts at district, regional, and tertiary hospitals where most cases of severe malaria are treated. Additionally, to alleviate the heavy technical burden of activities on the NMCP, starting with FY 2022 funds and continuing with FY 2023 funds, PMI will support the hiring of a devoted technical advisor who will provide mentoring, technical guidance, and support on issues of national level coordination to MIP and case management focal points.

Commodities

PMI will continue to procure malaria RDTs, ACTs, and drugs for severe malaria as described in the Recent Progress section. Now that the commodities covered by the Global Fund New Funding Mechanism 3 Grant (July 2021–June 2024) are confirmed, PMI has adjusted the commodities in FY 2022 and FY 2023 to cover gaps. PMI will procure single test kit RDTs for use by CHWs, and the ACTs will be distributed to CHWs as needed. PMI will not procure RAMS, which have a surplus in 2023.

Please refer to the **ACT, RDT, injectable artesunate, and artesunate suppository Gap Analysis Tables** in the annex for more detail on planned quantities and distribution channels.

Facility Level

PMI will continue to support facility-level health activities as described in the Recent Progress section. The team will work closely with the Global Fund, the Foreign Commonwealth and Development Office, the World Bank, and the USAID health team to determine if adjustments to PMI-supported districts are needed, but the overall level and scope of support will not change. Additionally, conflicting evidence on adherence to RDT results indicates that nonadherence remains a key challenge to effective case management. Thus, PMI will support the implementation of an automated RDT reader in select facilities to determine whether it is an effective tool to improve adherence to RDT results, and to reduce supervisory costs and needs (please see the Surveillance, Monitoring, and Evaluation section for further details).

Community Level

PMI will continue to support community health activities as described in the Recent Progress section. The team will work closely with the Global Fund, the Foreign Commonwealth and Development Office, the World Bank, and the USAID health team to determine if adjustments with respect to which districts PMI supports are needed, but the overall level and scope of support should not change.

4.4. Monitoring Antimalarial Efficacy

Table 3. Ongoing and Planned Therapeutic Efficacy Studies (TES)

Ongoing Therapeutic Efficacy Studies (TES)			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2021–2022	Bo	AL and ASAQ*	PARMA Hub or CDC Atlanta
2021–2022	Kenema	AL and ASAQ	PARMA Hub or CDC Atlanta
2021–2022	Bombali	AL and ASAQ	PARMA Hub or CDC Atlanta
Planned TESs (funded with previous or current MOP)			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2024–2025	TBD (3 total)	AL and ASAQ	TBD

*artemether-lumefantrine and artesunate-amodiaquine

PARMA: PMI-supported Antimalarial Resistance Monitoring in Africa

PMI is currently completing a two-arm TES for artemether-lumefantrine (AL) and AS-AQ in three districts (2021–2022). Per WHO guidelines, PMI proposes to conduct another two-arm TES for AL and AS-AQ in three districts in 2024–2025 (funding split between the FY 2023 and FY 2024 MOPs).

5. Health Supply Chain and Pharmaceutical Management

5.1. PMI Goal and Strategic Approach

The NMESP objectives are to focus on the provision of diagnostic tests and effective treatment at public, private and community levels; improve malaria data collection and reporting through HMIS (public and private); and strengthen procurement and supply chain management of malaria commodities. The Test, Treat, and Track approach remains a vital component of the strategic plan and relies on the availability of quality-assured malaria commodities in public, private, and community health facilities at all points in time. PMI and the Global Fund will provide adequate malaria health commodities for the newly revamped national CHW program. PMI will also work with MOHS and other partners to develop adequate tools to monitor CHW commodities. The NMCP seeks to strengthen the capabilities of health workers in the areas of procurement and supply chain management, both in the public and private health sectors. In addition, the NMCP is focused on improving the supply of malaria prevention and treatment commodities by strengthening forecasting and supply planning and improving warehousing, storage, and distribution systems. The Directorate of Pharmaceutical Services and the National Medical Supplies Agency (NMSA) lead the overall MOHS supply chain system and are responsible for commodity procurement, warehousing, and distribution to 40 hospitals and 1,300 PHUs.

PMI supports the supply chain through procurement, technical system strengthening, and ensuring uninterrupted supplies of health commodities at all levels of service delivery. PMI supports the NMCP with commodity procurement and logistics, system strengthening, and collaboration to improve the long-term availability of health commodities. This aligns with the national strategies and priorities in the NMESP which seek to provide access to quality malaria control interventions, including malaria commodities, for all. PMI's vision for Sierra Leone's public health system includes the improvement and strengthening of its supply chain system, specifically focusing on data management and use at the district and facility level in an effort to reduce stockouts, over-stocking, and malaria commodity expirations.

To reduce stockouts, PMI has begun implementing the PMI Stockout Reduction Strategy in partnership with the NMCP and the NMSA. PMI supports training and supportive supervision interventions at the central level and service delivery points to improve data management and demand-driven distribution of commodities. PMI supports skills building for improved usage of consumption data, routine stock assessment of commodities to improve data quality, and ensuring min/max levels are maintained with pipelines. In addition, PMI supports routine supervision visits at the facility level to validate data and redistribute malaria commodities to prevent stockouts.

5.2. Recent Progress (between April 2021 and April 2022)

- PMI supported quarterly Malaria Quantification TWGs that are critical for logistics and stock decisions. In July 2021, PMI supported the TWG to conduct a national stock validation exercise of malaria commodities in all central, district, and hospital stores. This exercise was necessary to conduct the annual quantification and forecasting. In August 2021, a forecast was completed for a 24-month period (January 2022 to December 2023) using three methods and types of data: demographic, consumption, and morbidity.
- PMI supported the training of two staff members from the Directorate of Pharmaceutical Services (DPS) and the NMCP in the new Quantification Analytics Tool. This training served as a Training of Trainers, and the cascade training for malaria quantification TWG members will occur in the third quarter of calendar year 2022.
- PMI supported the development of guidelines for conducting national forecasting, which has enabled a shift in focus to building the capabilities of Forecast and Distribution TWG members to conduct forecasting at the district level.
- PMI led the establishment of the District Forecasting TWGs in all 16 districts in Sierra Leone that have continued to conduct regular quarterly meetings. PMI collaborated with the DPS, NMCP and NMSA to provide technical support to District TWG members to decentralize forecasting and distribution activities to the DHMTs. PMI supported all 16 districts to conduct their own district-level forecasts for 2022 and 2023. The National Malaria TWG consolidated the results to compute the national forecast.
- PMI continued to support implementation of the Malaria Supply Chain Monitoring System (MSCMS) in seven districts (Bo, Falaba, Kailahun, Koinadugu, Port Loko, Pujehun, and Tonkolili). Through the MSCMS, PMI supply chain staff work with DHMTs to analyze available LMIS data and provide supportive supervision and guidance on how to use data to increase accessibility of malaria commodities to PHUs. On a quarterly basis, District Forecasting TWG members, with technical support from PMI, NMCP, DPS and NMSA, provided supportive supervision to underperforming health facilities identified during quarterly review meetings. Additionally, health facility data were collected using standardized checklists covering the following thematic areas: consumption, HMIS, availability, expiry, and systems. These data were utilized to encourage district and peripheral staff to build data-driven action plans.
- The MSCMS is part of PMI's efforts in the PMI Stockout Reduction Strategy. In addition, LMIS reporting has improved with its integration into District Health Information System 2 (DHIS2), but for some commodities, like ACTs,

LMIS data are currently too incomplete or inaccurate to be used for decision-making. However, LMIS reporting is robust for certain commodities like RDTs. Sierra Leone LMIS data revealed that nationally, the percentage of PHUs with at least one day of an RDT stockout during a given month averaged 5.6 percent, with a high of 11.5 percent in September 2021. Analysis of LMIS data now allows DHMTs to identify the PHUs for supply chain improvements for at least some malaria commodities.

- In close collaboration with the NMSA and NMCP, PMI continued to support routine distribution of ITNs from the central to district level and from district level to 1,300+ PHUs nationwide.
- PMI collaborated with DPS, Directorate of Policy, Planning and Information (DPPI), NMSA, and other stakeholders to ensure the RRIV-DHIS2 data server "backend" reflects basic supply chain principles and provides access to LMIS dashboards for each disease program. PMI also provided technical support to DPS and DPPI to complete RRIV-DHIS2 training for district and program staff to capture the new RRIV forms in DHIS2, monthly data review and response, and increased LMIS data visibility and use.

5.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of health supply chain and pharmaceutical management systems strengthening that PMI proposes to support in Sierra Leone with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

PMI will continue to support the same activities as described above in the Recent Progress section. PMI will continue to support the NMCP with forecasting and supply planning. PMI's investment in supply chain strengthening will continue to evolve, with greater focus at the district level to increase capacity to monitor and reduce the likelihood of stockouts at the peripheral levels. PMI will continue supporting the MSCMS at facilities in all districts and support DPS and NMCP to analyze MSCMS data for decision- and policy-making. PMI will continue to support the capacity building of PHU personnel on LMIS and inventory control, and will invest in the process of digitizing LMIS data collection at the PHU level to improve reporting, data responsiveness, and decision-making. RRIV integration into DHIS2 is the beginning of this process.

With the implementation of the new CHW strategy, PMI will provide technical assistance in the development of CHW LMIS reporting. In addition, PMI will conduct two end-use verification surveys to assess availability of commodities at the PHU level for the MOHS and assist NMSA and DPS in improving supply chain activities and strategies.

6. Social and Behavior Change

6.1. PMI Goal and Strategic Approach

PMI's support to the implementation of the NMCP's Malaria Elimination Behavior Change Communication Strategy 2017–2022 fully aligns with and contributes to the attainment of all seven objectives of the NMESP 2021–2025, particularly Objective 3: 90 percent of the population practicing at least three recommended malaria prevention and control behaviors by 2025. PMI provides technical assistance at the national level and in six districts (Bo, Falaba, Kailahun, Koinadugu, Port Loko, and Pujehun) for the design and implementation of evidence-informed, theory-based, and innovative SBC activities to: 1) improve the capacity of partners to coordinate, design, implement, monitor, and evaluate effective SBC at the national and sub-national levels (including support for national and district-level quarterly TWGs and improved use of data for decision-making); 2) strengthen functional linkages between health facilities and communities to coordinate demand- and supply-side efforts for service delivery; and 3) improve individual and social determinants of health to facilitate individual and household adoption of priority behaviors informed by the 2019 Malaria Behavior Survey (MBS) results. PMI recently provided technical input for the development of the Social Behavior Change Communication Strategy for Malaria in Pregnancy 2022-2025 (led by World Vision) and will support efforts to revise the Malaria Elimination Behavior Change Communication Strategy and other relevant guidelines to align with the NMESP.

6.2. Recent Progress (between April 2021 and April 2022)

- Coordinated and provided technical guidance and support for 12 national-level TWG meetings (frequency increased to support key SBC activities implemented by various partners).
- Increased support for quarterly, district-level TWGs from four districts (Bo, Koinadugu, Port Loko, and Pujehun) to six (adding Falaba and Kailahun), implemented in close collaboration with the NMCP and Health Education Division. By December 2021, Bo and Pujehun took leadership of their SBC TWG meetings independent of financial support from PMI.
- Provided ongoing support to the NMCP to develop a comprehensive SBC message guide informed by the 2019 MBS results that highlight actionable takeaways from key malaria health behaviors.
- Facilitated training sessions for a total of 120 Facility Management Committees (FMCs) across Bo, Koinadugu, Port Loko, and Pujehun to build their capacity and provide them tools to orient their respective communities on malaria prevention and control measures. These sessions also served to refresh their knowledge on their roles and responsibilities as FMCs. NMCP and Health Education Division staff also participated in the training and

contributed to facilitation activities. Following the training, PMI conducted field visits to the four districts to monitor FMC-implemented activities, identify implementation gaps, and provide support to facilitate FMC engagement with CHWs within their respective communities.

- Coordinated and participated in problem solving sessions with multiple SBC implementing partners to identify strategies to improve prompt care-seeking at the community level through engagement of traditional healers and medicine vendors as referral channels. PMI has drafted a concept note to engage this important cadre of influencers and evaluate implementation efforts in coordination with the Global Fund.
- Using results from the 2019 MBS, provided technical guidance for the development of SBC activities associated with the 2021 IRS campaign. PMI printed 134,421 communication materials (banners, posters, brochures, frequently asked questions, etc.) with messages to promote community-level acceptance of IRS.
- Sponsored Facebook posts on malaria prevention and control, IRS, and prompt care-seeking for fever, reaching 643,000 reached and achieving 20,735 post engagements (likes, shares, and comments).

Despite the recent progress, challenges remain and are outlined by technical area below. Continued SBC investment is needed to address the determinants of uptake and/or maintenance of prevention, care-seeking, and treatment behaviors.

- **ITNs:** Access to ITNs remains low. Over the past five years, it has ranged between 37 percent and 47 percent, with the most recent data indicating access to ITNs was 43 percent (MIS 2021), despite the completion of a mass distribution campaign 12 months prior to the survey. While access is low, Sierra Leone's ITN use to access ratio is 1.08, although this may be due to multiple household members sleeping under the same net (i.e., more than two people per net) (2019 DHS). Across entomological monitoring sites, analyses of human landing collections indicated biting times ranging from 11:00pm–5:00am (with peak times varying by site), when the majority of household members are expected to be in bed and using ITNs. However, bloodmeal analyses of captured mosquitoes indicated that 94 percent had fed exclusively on human blood, suggesting that household members are not sleeping under ITNs for the duration of the night, despite the self-reported household survey data indicating high levels of net usage. These findings may require further assessment to tailor SBC programming that addresses this apparent contradiction between reported and empirical data.
- **MIP:** Preliminary results from the 2021 MIS indicate that uptake for IPTp1 (92 percent) and IPTp2 (81 percent) are high; however, uptake of IPTp3 is just 52

percent. Data from the 2019 MBS indicate that 56 percent of women in Port Loko and 53 percent in Bo knew pregnant women are more susceptible to malaria. Further, 68 percent of women across the two districts had a positive attitude toward ANC and IPTp. However, shared decision-making between a woman and her spouse or partner regarding regular ANC attendance was low (45 percent in Bo, 35 percent in Port Loko).

- **Case Management:** According to preliminary results from the 2021 MIS, 69 percent of caregivers sought care for a child from a PHU and 7 percent from a CHW; however, prompt care-seeking (treatment sought the same or next day) was only 40 percent. The 2019 MBS concluded that significant influences on prompt care-seeking for fever included self-efficacy to seek such care; positive attitudes toward prompt care-seeking; and discussing malaria with a spouse/partner.
- **Provider Behavior:** There is conflicting evidence on adherence to RDT results. Health care workers score highly during OTSS+ visits, but a 2019 qualitative provider assessment reported that while health workers accept positive RDT results, they question the reliability of negative results, noting their training to identify malaria symptoms is more reliable than a negative RDT result. Similarly, there are discrepancies between consumption of ACTs and confirmed malaria cases. The combination of consumption data and qualitative provider assessment together indicate that nonadherence to RDT results remains a key challenge to effective case management and surveillance.

6.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of SBC activities that PMI proposes to support in Sierra Leone with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables. While PMI supports SBC activities that promote the uptake and maintenance of all key malaria interventions, the behaviors in Table 4 will be prioritized with FY 2023 funds.

Table 4. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
Consistent ITN use (all night)/ ITN maintenance and care	All household members	All PMI-focus districts	• Coordinate and develop multi-pronged (including communication and non-communication-based approaches) SBC activities to promote ITN use all night. • Continue post-ITN campaign (2023) activities to promote maintenance of ITN use and care, all year-round. Activities will be coordinated across implementing partners and stakeholders.
Prompt care-seeking within the same or next day of fever onset	Caregivers of children under 5 years of age, heads of households, CHWs, community leaders	All PMI focus districts	• Coordinate with the CHW Hub and other partners to increase knowledge and positive perceptions of the services CHWs provide. • Support SBC action planning by community leaders, CHWs, and facility-based providers to promote uptake of prompt care-seeking, in coordination with service delivery partners. • Develop multi-pronged SBC activities tailored for differences between caregivers residing in rural and urban areas. • Promote gender transformative approaches that create space for safe spousal communication and promote spousal dialogue for prompt care-seeking.
Adherence to case management guidelines	Facility and community-based health workers	All PMI-focus districts	• Develop and use provider behavior change activities addressing motivational and normative barriers to performance. • Support design of feedback systems to facilitate strengthened connections among facilities, CHWs, and communities to promote quality service improvement.

Across all prioritized behaviors and defined geographies, SBC activities will continue to deploy approaches to leverage PMI's strategic advantage for coordination and technical assistance given the landscape of SBC implementing partners at the community level (e.g., the Global Fund). Reductions in overall funding levels for SBC interventions are anticipated to be offset by gains in current PMI investments to increase financial and technical support for the CHW program. CHWs will be leveraged to deliver community-level interpersonal communication to promote uptake and maintenance of interventions and will expand access and delivery of malaria services. Further, PMI will leverage joint investments with other health activities throughout supported districts.

Additional Support Activities

PMI will determine if there are existing gaps in evidence or shifts in ideational determinants of priority malaria behaviors among specific populations by triangulating

human and mosquito behavior data and using the results of the 2019 MBS, the qualitative provider assessment in Bo and Port Loko, the 2021 MIS, and the 2024 DHS. Utilizing FY 2023 funding, PMI is planning to conduct a new OR study to assess the impact that implementing automated RDT readers at the facility level has on adherence to appropriate treatment protocols (please see Operation Research and Program Evaluation section for more details).

Capacity building

Despite improvements in overall capacity for SBC in Sierra Leone, there is still a need to strengthen the NMCP and partners' ability to implement, coordinate, and monitor SBC partner activities. In 2022, PMI will facilitate and host a Leadership in Strategic Communication Workshop for malaria SBC stakeholders (e.g., NMCP, CRS) to build implementation capacity, including improved data use for decision-making. With FY 2023 funds, PMI will build on the workshop to bolster capacity for SBC in Sierra Leone at both national and district levels. PMI will continue to support the national-level SBC TWG and quarterly meetings with SBC TWGs in six PMI focus districts. In 2022, PMI and other stakeholders will assist the NMCP to revise and update the national communication strategy to align with the NMESP 2021–2025. The updated strategy will include robust SBC implementation activities designed to target specific audiences and behavioral determinants, and PMI will support the NMCP to implement them with FY 2023 funds. PMI will continue to strengthen the relationship between the NMCP and the Roll Back Malaria! SBC working group to ensure lessons are shared between Sierra Leone and global actors.

7. Surveillance, Monitoring, and Evaluation

7.1. PMI Goal and Strategic Approach

In Sierra Leone, PMI collaborates with NMCP and the Global Fund to provide technical assistance and resources for SM&E activities, with an objective to strengthen malaria surveillance and use of malaria information to improve decision-making for program performance. The NMESP's primary SM&E objective is to achieve more than 95 percent of district health facilities and CHWs routinely reporting on malaria health indicators. In addition, PMI and NMCP have prioritized interventions such as:

- Support quarterly national and district-level data review meetings to increase data use for decision-making centrally and at the peripheral level
- Conduct and facilitate health facility and population-based surveys
- Produce quarterly malaria bulletins
- Support the development and implementation of a national health digitalization roadmap and a community health information system
- Integrate all malaria data collection and reporting tools into DHIS2

To strengthen malaria surveillance, NMCP collaborates with DPPI to strengthen the technical capacity of health workers at all levels and CHWs and to maintain a logistic infrastructure for an effective functioning DHIS2 with improved HMIS data collection and reporting completeness, accuracy, and timeliness.

7.2. Recent Progress (between April 2021 and March 2022)

PMI supported the following activities at the central level:

- Assisted with revisions of HMIS and LMIS data collection and reporting tools and integration into DHIS2
- Provided technical assistance in the completion of the 2021MIS
- Trained two NMCP staff on SM&E
- Supported the development of the National Malaria Monitoring and Evaluation Plan 2021–2025
- Conducted quarterly national malaria review meetings and supportive supervision to district hospitals and PHUs.
- Supported hospital (as opposed to PHUs) malaria surveillance data management by the NMCP, as public and private hospitals do not consistently report through DHIS2.

PMI supported the following activities at the district, chiefdom, and health facility level:

- Organized and supported sub-national malaria data review meetings in three districts
- Trained DHMT staff in six districts on data management and routine data quality assessment
- Procured computers, projectors, and printers for district malaria and surveillance staff in all districts to assist them in data analysis and data use for decision-making
- Developed and implemented the Malaria Routine Data Quality Assessment tool in five districts to begin to improve reported HMIS data quality.

PMI supported NMCP to review their M&E plan to help identify gaps and develop solutions to improve the SM&E plan for program implementation. The review provided an opportunity for the NMCP and its partners to understand the importance of an SM&E plan as a living document and the need to align it to the strategic interventions covering all objectives.

Key Challenges:

- PMI activities were interrupted in 2021 due to delayed District Data Officers' salary payments and enrollment into government payroll, which affected completeness and timeliness of reporting.

- Introduction of the new MOHS daily subsistence allowance policy that repeals any existing similar policies slowed down and limited some planned data quality assessment and capacity building activities. In addition, work plan activities have been reduced in scope and scale to accommodate the changed costs.
- Most public and private hospitals and nongovernmental organizations are using parallel data management platforms instead of DHIS2, leading to uncoordinated, irregular malaria reporting and service delivery at these institutions.
- The DMTs' manual imputing of most HMIS data is resulting in an unduly heavy workload.
- DHMTs lack backup systems for data storage.
- Intermittent stockout of data collection and reporting tools has hampered completeness and timeliness of reporting.
- The low rate and poor quality of data reporting of inpatient hospital data hampers availability of morbidity and mortality data.
- SM&E capacity at the district level is inadequate, specifically capacity in documentations and data management, analysis, use.

- **Plans and Justification with FY 2023 Funding**

The FY 2023 funding tables contain a full list of SM&E activities that PMI proposes to support in Sierra Leone with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

- PMI will concentrate on HMIS strengthening activities in high burden districts and underserved, hard-to-each areas.
- Functional SM&E structures are required to address gaps in data management systems, improve malaria surveillance and SM&E capacity, and enhance the use of data for decision-making.
- PMI will provide technical assistance to improve the quality of data and assist the NMCP in using HMIS to assess trends in inpatient malaria morbidity and mortality.

PMI support will geographically focus on central-level SM&E capacity development, which will yield nationwide improvements, with less assistance to focus districts. For the latter, the districts to receive assistance will be determined by need basis.

Table 5. Available Malaria Surveillance Sources

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Household Surveys	Demographic Health Survey					P	
Household Surveys	Malaria Indicator Survey		X*				
Household Surveys	Multiple Indicator Cluster Survey					P*	
Household Surveys	EPI survey						
Health Facility Surveys	Service Provision Assessment						
Health Facility Surveys	Service Availability Readiness Assessment survey						
Health Facility Surveys	Other Health Facility Survey						
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies			X		P	
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response	X*	X*	X*	P*	P*	P*
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						
Other	End-use Verification Survey					P	
Other	School-based Malaria Survey				P*	P**	
Other	Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey						
Other	Malaria Impact Evaluation						
Other	Entomologic Monitoring Surveys	X	X	X	P	P	P

Note: Asterisk denotes non-PMI funded activities, X denotes completed activities, and P denotes planned activities.

8. Operational Research and Program Evaluation

8.1. PMI Goal and Strategic Approach

PMI works with the NMCP to help define opportunity areas for OR and, where appropriate, supports the NMCP, other donors, and implementing partners on specific research initiatives. The NMESP indicates that appropriate operational research will guide all malaria policies, in alignment with Objective 4: Strengthen malaria surveillance

and use of malaria information to improve decision-making for program performance. In June 2018, the NMCP, in collaboration with several academic institutions and other partners, defined their first Malaria Research Agenda for the period 2018–2023. This agenda identifies all aspects of malaria control as priority areas, including epidemiology, diagnostics and treatment, prevention, vector control, monitoring and evaluation, and the RTS,S vaccine. However, operationalizing this agenda has been a challenge due to resource constraints and limited bandwidth of the NMCP.

To overcome some of these challenges, the NMCP is in the process of forming a new OR unit and an associated TWG with key partners and intends to build the capacity of a core group of national staff on the skills necessary for robust OR activities. PMI and its implementing partners will participate in the TWG to support the refinement and operationalization of the Malaria Research Agenda. The goal of the NMCP is for every unit to implement at least one OR activity per year.

8.2. Recent Progress (between April 2021 and April 2022)

PMI is currently supporting the NMCP on a study to evaluate the impact of co-deploying PBO ITNs and next generation IRS on entomological and malaria health indicators in comparison to PBO ITNs as a stand-alone intervention. The research will compare the data from the two IRS districts, Bo and Bombali, to two control districts, Karene and Port Loko. Baseline entomological data collection was completed in May 2021. Primary entomological data collection for the study was initiated in June 2021 and was intended to conclude in June of 2022. HMIS epidemiological data assessment for the baseline report covered the time period of May 2018–April 2021. Post-IRS intervention, HMIS data will be analyzed from May 2021–April 2023.

Additionally, PMI had been supporting the NMCP with the evaluation of deploying RAMs as a pre-referral treatment of severe malaria in children. Final analysis was completed during this timeframe, and the NMCP presented the findings at the American Society of Tropical Medicine and Hygiene (ASTMH) meeting in the fall of 2021.

Table 6. PMI-funded Operational Research/Program Evaluation Studies in Sierra Leone

Recently Completed OR/PE Studies	Status of Dissemination	Start date	End date
How successful and which factors contributed to the successful deployment of and proper usage of RAMS as a pre-referral treatment of severe malaria in children under five years of age	Results were shared at ASTMH 2021	Sept. 2020	Feb 2021
Ongoing or Planned OR/PE Studies	**Status**	**Start date**	**End date**
Does co-deployment of two next-generation vector control interventions (PBO ITNs and SumiShield® IRS) significantly reduce entomological and malaria case indicators as compared to a single next generation vector control intervention (PBO ITNs)?	Field data collection	Summer 2020	Summer 2022
Can household screening serve as a complementary vector control intervention to address known challenges with ITN use? (Reference the FY 2022 MOP for more details)	Concept note development	2023	TBD

Table 7. Non-PMI-funded Operational Research/Program Evaluation Studies Planned/Ongoing in Sierra Leone

Source of Funding	Implementing institution	Research Question/Topic	Current status/ timeline
European Union	MOHS, NMCP, College of Medicine and Allied Health Sciences-University of Sierra Leone, Barcelona Institute for Global Health	Malaria prevention with six doses of IPTi (SP)	Ongoing

8.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of OR/PE activities that PMI proposes to support in Sierra Leone with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

With FY 2023 funding, PMI is planning to conduct a new OR study to assess the impact of automated RDT readers at the facility level on adherence to appropriate treatment protocols.

2021 data from the LMIS indicate that the 2,030,571 ACTs consumed were nearly 2.6 percent higher than the number of confirmed malaria cases. However, the 2020 LMIS data are more concerning, as they showed that ACTs consumed were nearly 20 percent higher than the number of confirmed cases. There are several potential drivers for this discrepancy:

- Nonadherence to RDT results
- Over-reporting of ACTs consumed on RRIV forms
- Data quality issues
- Reporting is of number of tablets prescribed versus complete doses

A 2019 qualitative provider assessment reported that while health workers accept positive RDT results, they question the reliability of negative results noting their training to identify malaria symptoms is more reliable than a negative RDT result. This conflicts with the high adherence scores from OTSS+ visits, but indicates that the perception of being supervised may drive stronger adherence. Additionally, the test positivity rate data fluctuate with the seasons, showing a decrease during the dry season and an increase during the wet seasons. However, there was little fluctuation in 2021, with the wet seasons peaking at 66 percent and the dry season bottoming out at 61 percent.

The combination of consumption data and qualitative provider assessment together indicate that nonadherence to RDT results remains a key challenge to effective case management. Therefore, PMI intends to implement automated RDT readers in facilities to understand the impact they have on provider adherence behaviors and higher quality data. It is hypothesized that the reader will consistently strengthen accountability for following testing and treatment protocols, much like OTSS+ visits appear to do when providers are being observed.

9. Capacity Strengthening

9.1. PMI Goal and Strategic Approach

Building and strengthening the capacity of Sierra Leone's people and institutions—from the central level to communities—to effectively lead and implement evidence-based malaria control and elimination activities is paramount to PMI. It is also a key component of the NMESP, which aims to strengthen and maintain capacity for program management, coordination, and partnership to achieve malaria program performance at all levels. To improve ownership and management of malaria activities, the NMCP's strategic plan prioritizes capacity building as a cross-cutting intervention by strengthening the national and districts' capacity to deliver malaria control services at all levels. It also prioritizes strengthening core MOHS-wide management systems that are essential for effective delivery and management of malaria services, such as strengthening procurement and supply chain management of malaria commodities, improving malaria data collection and reporting through HMIS, and strengthening coordination and partnerships in malaria control. The FY 2023 MOP supports capacity building through skills building and system strengthening across all malaria interventions including vector control, case management, community health, and MIP, and critical support systems such as the supply chain, surveillance, monitoring and

evaluation, and operations research. In addition, while PMI understands it will take time for Sierra Leone to fully finance its development priorities, PMI coordinates closely across the U.S. government and with other donors and partners to jointly track Sierra Leone's funding commitments across the malaria portfolio.

9.2. Recent Progress (between April 2021 and April 2022)

PMI supports several cross-cutting capacity building activities focused within the core technical intervention areas described above (e.g., training of health workers, strengthening DHMTs in conducting supportive supervision and mentoring, supporting pharmaceutical management systems, community-level communications, etc.) that complement the existing work of other U.S. government entities and other donors/partners. In addition, PMI supported an embedded technical advisor in the MOHS's Community Health Hub. This advisor is building Hub leadership and management capacity to ensure a coordinated, integrated approach to community health that supports trained CHWs in delivering quality malaria and health services. PMI anticipates the following additional progress in calendar year 2022:

- Assuming that the Peace Corps restarts activities with volunteers returning to Sierra Leone in summer of 2022, PMI will support the small project grants for malaria-related activities developed by volunteers. In addition, PMI will work closely with the Peace Corps to determine whether third-year volunteers will be available in 2023 to carry out dedicated malaria projects that might need support.
- PMI plans to support a malaria technical advisor embedded in the NMCP to assist with building capacity in management, leadership, and governance with FY 2022 funding.
- PMI will support Sierra Leoneans to complete the intermediate and/or advanced Field Epidemiology Training Program with FY 2022 funding. PMI will work with the Field Epidemiology Training Program team on selection criteria to ensure the resident(s) is/are malaria-focused and that the investment is utilized as a skill-building opportunity for the NMCP.
- With prior year funds, PMI will conduct an assessment of local partners in the areas of pre-service training for health workers and entomologists, social behavior change interventions, and research and innovation, among others, to identify potential Sierra Leonean organizations to partner with.

9.3. Plans and Justification with FY 2023 Funding

PMI will continue to support capacity strengthening activities as a cross-cutting strategy for malaria interventions as described in the Recent Progress section. PMI expects that there will be sufficient FY 2022 funds for Peace Corps activities to continue through 2024; thus, no FY 2023 funding is planned. With FY 2023 funding, PMI will continue to

invest in capacity building for local partners based on the results of the assessment. In other countries, for example, similar assessments have identified needs for organizational capacity building related to learning how to do business with USAID, complying with USAID policies, report writing, monitoring, evaluation and learning, and procurement, among others. Once PMI has identified partners that are ready or almost ready to partner with USAID via the assessment being completed in 2022–2023, then PMI will use FY 2023 funds to provide organizational development support in those areas that the selected partners would benefit from.

The FY 2023 funding tables contain a full list of capacity strengthening activities that PMI proposes to support in Sierra Leone with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

10. Staffing and Administration

A minimum of three health professionals oversee PMI in Sierra Leone. The single interagency team led by the USAID Mission Director or their designee consists of a Resident Advisor representing USAID, a Resident Advisor representing CDC, and one or more locally hired experts known as Cooperating Country Nationals. The PMI interagency team works together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance and direction to PMI implementing partners.

ANNEX: GAP ANALYSIS TABLES

Table A-1. ITN Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	8,529,615	8,746,749	8,969,980
Total population at risk for malaria	8,529,615	8,746,749	8,969,980
PMI-targeted at-risk population	8,529,615	8,746,749	8,969,980
Population targeted for ITNs	8,529,615	8,746,749	8,969,980
Continuous Distribution Needs			
Channel 1: ANC	374,237	383,764	393,558
Channel 1: ANC Type of ITN	Dual AI and PBO	Dual AI and PBO	Unknown
Channel 2: EPI	290,007	314,883	322,919
Channel 2: EPI Type of ITN	Dual AI and PBO	Dual AI and PBO	Unknown
Channel 3: School			
Channel 3: School Type of ITN	Unknown	Unknown	Unknown
Channel 4: Community	0	0	0
Channel 4: Community Type of ITN			
Channel 5:	0	0	0
Channel 5: Type of ITN			
Estimated Total Need for Continuous Channels	664,244	698,647	716,477
Mass Campaign Distribution Needs			
Mass distribution campaigns		5,345,236	0
Mass distribution ITN type		Dual AI and PBO	
Estimated Total Need for Campaigns	0	5,345,236	0
Total ITN Need: Continuous and Campaign	**664,244**	**6,043,882**	**716,477**
Partner Contributions			
ITNs carried over from previous year	101,050	5,634,538	289,303
ITNs from Government	0	0	0
Type of ITNs from Government			
ITNs from Global Fund	5,459,037	698,647	358,239
Type of ITNs from Global Fund	Dual AI and PBO	Unknown	Unknown
ITNs from other donors	0	0	0
Type of ITNs from other donors			
ITNs planned with PMI funding	738,695	0	257,000
Type of ITNs with PMI funding	Dual AI and PBO	Dual AI	Dual AI
Total ITNs Contribution Per Calendar Year	**6,298,782**	**6,333,185**	**904,542**
Total ITN Surplus (Gap)	**5,634,538**	**289,303**	**188,065**

Table A-2. RDT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	8,529,615	8,746,749	8,969,980
Population at risk for malaria	8,529,615	8,746,749	8,969,980
PMI-targeted at-risk population	8,529,615	8,746,749	8,969,980
RDT Needs			
Total number of projected suspected malaria cases	6,985,755	7,163,587	7,346,414
Percent of suspected malaria cases tested with an RDT	80%	85%	90%
RDT Needs (tests)	**5,085,629**	**5,419,254**	**5,752,242**
Needs Estimated based on Other (specify in comments)			
Partner Contributions (tests)			
RDTs from Government	0	0	0
RDTs from Global Fund	5,058,075	5,414,622	2,863,830
RDTs from other donors	0	0	0
RDTs planned with PMI funding	1,400,000	900,000	900,000
Total RDT Contributions per Calendar Year	**6,458,075**	**6,314,622**	**3,763,830**
Stock Balance (tests)			
Beginning Balance	2,612,775	3,985,221	4,880,589
- Product Need	5,085,629	5,419,254	5,752,242
+ Total Contributions (received/expected)	6,458,075	6,314,622	3,763,830
Ending Balance	**3,985,221**	**4,880,589**	**2,892,177**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	2,542,815	2,709,627	2,876,121
Total Surplus (Gap)	**1,442,406**	**2,170,962**	**16,056**

Table A-3. ACT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	8,529,615	8,746,749	8,969,980
Population at risk for malaria	8,529,615	8,746,749	8,969,980
PMI-targeted at-risk population	8,529,615	8,746,749	8,969,980
ACT Needs			
Total projected number of malaria cases	3,422,461	3,728,934	4,049,049
Total ACT Needs (treatments)	**3,530,768**	**3,846,940**	**4,177,185**
Needs Estimated based on Other (specify in comments)			
Partner Contributions (treatments)			
ACTs from Government	0	0	0
ACTs from Global Fund	4,399,134	3,843,652	2,079,667
ACTs from other donors	0	0	0
ACTs planned with PMI funding	950,000	500,000	1,500,000
Total ACTs Contributions per Calendar Year	**5,349,134**	**4,343,652**	**3,579,667**
Stock Balance (treatments)			
Beginning Balance	372,683	2,191,049	2,687,761
- Product Need	3,530,768	3,846,940	4,177,185
+ Total Contributions (received/expected)	5,349,134	4,343,652	3,579,667
Ending Balance	**2,191,049**	**2,687,761**	**2,090,242**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	1,765,384	1,923,470	2,088,593
Total Surplus (Gap)	**425,665**	**764,291**	**1,650**

Table A-4. Inj. Artesunate Gap Analysis Table

Calendar Year	2022	2023	2024
Injectable Artesunate Needs			
Projected number of severe cases	82,139	89,494	97,177
Projected number of severe cases among children	13,964	15,214	16,520
Average number of vials required for severe cases among children	3	3	3
Projected number of severe cases among adolescent	19,878	21,658	23,517
Average number of vials required for severe cases among adolescent	6	6	6
Projected number of severe cases among adults	48,298	52,623	57,140
Average number of vials required for severe cases among adults	9	9	9
Total Injectable Artesunate Needs (vials)	**595,837**	**649,192**	**704,923**
Needs Estimated based on Other (specify in comments)			
Partner Contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	545,574	553,486	299,472
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	221,000	500,000	220,000
Total Injectable Artesunate Contributions per Calendar Year	**766,574**	**1,053,486**	**519,472**
Stock Balance (vials)			
Beginning Balance	34,855	205,592	609,886
- Product Need	595,837	649,192	704,923
+ Total Contributions (received/expected)	766,574	1,053,486	519,472
Ending Balance	**205,592**	**609,886**	**424,434**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	297,918	324,596	352,462
Total Surplus (Gap)	**(92,326)**	**285,290**	**71,973**

Table A-5. RAS Gap Analysis Table

Calendar Year	2022	2023	2024
Artesunate Suppository Needs			
Number of severe cases expected to require pre-referral dose (or expected to require pre-referral dose based on number of providers for the service)	6,243	6,802	7,385
Total Artesunate Suppository Needs (suppositories)	**9,364**	**10,202**	**11,078**
Needs Estimated based on Other (please specify in comment section)			
Partner Contributions (suppositories)			
Artesunate suppositories from Government	0	0	0
Artesunate suppositories from Global Fund	0	0	0
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	20,000	20,000	0
Total Artesunate Suppositories Available	**20,000**	**20,000**	**0**
Stock Balance (suppositories)			
Beginning Balance	0	10,636	20,434
- Product Need	9,364	10,202	11,078
+ Total Contributions (received/expected)	20,000	20,000	0
Ending Balance	**10,636**	**20,434**	**9,356**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	4,682	5,101	5,539
Total Surplus (Gap)	**5,954**	**15,333**	**3,816**

Table A-6. SP (IPTp) Gap Analysis Table

Calendar Year	2022	2023	2024
Total Country Population	8,529,615	8,746,749	8,969,980
Total Population at Risk for Malaria	8,529,615	8,746,749	8,969,980
PMI Targeted at Risk Population	8,529,615	8,746,749	8,969,980
SP Needs			
Total Number of Pregnant Women	383,833	393,604	403,649
Percent of pregnant women expected to receive IPTp1	92%	94%	96%
Percent of pregnant women expected to receive IPTp2	81%	83%	85%
Percent of pregnant women expected to receive IPTp3	52%	54%	56%
Percent of pregnant women expected to receive IPTp4	45%	47%	49%
Total SP Needs (doses)	**1,036,348**	**1,094,218**	**1,154,436**
Needs Estimated based on Other (specify in comments)			
Partner Contributions (doses)			
SP from Government	0	0	0
SP from Global Fund	1,959,025	1,574,415	807,298
SP from other donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP Contributions per Calendar Year	**1,959,025**	**1,574,415**	**807,298**
Stock Balance (doses)			
Beginning balance	1,050,035	1,972,712	2,452,909
- Product Need	1,036,348	1,094,218	1,154,436
+ Total Contributions (Received/expected)	1,959,025	1,574,415	807,298
Ending Balance	**1,972,712**	**2,452,909**	**2,105,770**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	518,174	547,109	577,218
Total Surplus (Gap)	**1,454,538**	**1,905,799**	**1,528,552**

Table A-7. SP (IPTi) Gap Analysis Table

Calendar Year	2022	2023	2024
Total Country Population	8,529,615	8,746,749	8,969,980
Total Population at Risk for Malaria	8,529,615	8,746,749	8,969,980
PMI Targeted at Risk Population	8,529,615	8,746,749	8,969,980
SP Needs			
Total Number of under 1	341185	349870	358799
Proportion of infant expected to attend EPI at Penta-1	86%	88%	90%
Proportion of infant expected to attend EPI at Penta-2	75%	77%	79%
Proportion of infant expected to attend EPI at Penta-3	59%	61%	63%
Total SP Needs (Doses)	**375,303**	**395,353**	**416,207**
Needs Estimated based on Other (specify in comments)			
Partner Contributions (Doses)			
SP from Government	0	0	0
SP from Global Fund	774,188	395,353	208,104
SP from Other Donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP Contributions per Calendar Year	**774,188**	**395,353**	**208,104**
Stock Balance (Doses)			
Beginning balance	1,102,328	1,501,213	1,501,213
- Product Need	375,303	395,353	416,207
+ Total Contributions (Received/expected)	774,188	395,353	208,104
Ending Balance	1,501,213	1,501,213	1,293,109
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	187,652	197,677	208,104
Total Surplus (Gap)	**1,313,561**	**1,303,536**	**1,085,006**